#6



SEQUENCE LISTING

<110> BAYER AG

<120> DNA encoding the tobacco phytoene synthase

<130> Le A 34 326

<140> US/09/847,081 A
<141> 2001-05-02

<160> 10

<170> PatentIn Ver. 2.1

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<213> Nicotiana tabacum

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gatagactct agtggatatc tacaagtatt ggttttttga taaaataggc tgaggtgaga 180

aggtaacata aaggaaagac aaaaacttgg gaattgtttt agaccaccga ggtttcttgt 240

ttc atg agc atg tct gtt gct ttg ttg tgg gtt gtt tct ccc act tcc 288
Met Ser Met Ser Val Ala Leu Leu Trp Val Val Ser Pro Thr Ser
1 5 10 15

gag gtc tcg aat ggg aca gga ttg ttg gat tca gtc cga gaa gga aac 336
Glu Val Ser Asn Gly Thr Gly Leu Leu Asp Ser Val Arg Glu Gly Asn
20 25 30

cgc gtc ttt gta tca tcc agg ttc cta gct cga gat agg aat ttg atg 384

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Arg Val Phe Val Ser Ser Arg Phe Leu Ala Arg Asp Arg Asn Leu Met
             35                  40                  45

tgg aat ggg aga atc aag aaa ggt ggg aga caa agg tgg aat ttt ggc   432
Trp Asn Gly Arg Ile Lys Lys Gly Gly Arg Gln Arg Trp Asn Phe Gly
         50                  55                  60

tct tta att gct gat cca aga tat tca tgc ttg ggt gga tca aga act   480
Ser Leu Ile Ala Asp Pro Arg Tyr Ser Cys Leu Gly Gly Ser Arg Thr
     65                  70                  75

gaa aag gga agc act ttc tct gta cag tcc agt ttg gtg gct agc cca   528
Glu Lys Gly Ser Thr Phe Ser Val Gln Ser Ser Leu Val Ala Ser Pro
 80                  85                  90                  95

gct gga gaa atg act gtg tca tca gag aaa aag gtg tat gat gtg gta   576
Ala Gly Glu Met Thr Val Ser Ser Glu Lys Lys Val Tyr Asp Val Val
                100                 105                 110

tta aag cag gca gct tta gtg aag agg cag ctg aga tct acc gat gat   624
Leu Lys Gln Ala Ala Leu Val Lys Arg Gln Leu Arg Ser Thr Asp Asp
            115                 120                 125

tta gaa gtg aag ccg gat att gtt gtt cca ggg aat ttg ggc ttg ttg   672
Leu Glu Val Lys Pro Asp Ile Val Val Pro Gly Asn Leu Gly Leu Leu
        130                 135                 140

agt gaa gca tat gat cgt tgt ggc gaa gta tgt gca gag tat gca aag   720
Ser Glu Ala Tyr Asp Arg Cys Gly Glu Val Cys Ala Glu Tyr Ala Lys
    145                 150                 155

aca ttt tac tta gga acc aag cta atg acc cca gag aga aga aga gct   768
Thr Phe Tyr Leu Gly Thr Lys Leu Met Thr Pro Glu Arg Arg Arg Ala
160                 165                 170                 175

atc tgg gca ata tat gtg tgg tgc agg aga acg gat gag ctt gtt gat   816
Ile Trp Ala Ile Tyr Val Trp Cys Arg Arg Thr Asp Glu Leu Val Asp
                180                 185                 190

ggc cct aat gca tcc cac ata act ccg caa gct tta gat agg tgg gag   864
Gly Pro Asn Ala Ser His Ile Thr Pro Gln Ala Leu Asp Arg Trp Glu
            195                 200                 205
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acc agg ctg gaa gat att ttc agt ggg cgg cca ttt gat atg ctt gat   912
Thr Arg Leu Glu Asp Ile Phe Ser Gly Arg Pro Phe Asp Met Leu Asp
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gct gct tta tcc gat act gtc tcc aga ttt cct gtt gat att cag cca   960
Ala Ala Leu Ser Asp Thr Val Ser Arg Phe Pro Val Asp Ile Gln Pro
    225                 230                 235

ttc aga gat atg att gaa gga atg cgt atg gac ttg tgg aaa tcc aga   1008
Phe Arg Asp Met Ile Glu Gly Met Arg Met Asp Leu Trp Lys Ser Arg
240                 245                 250                 255

tac aaa act ttc gat gag cta tat ctc tat tgt tac tat gtt gct ggt   1056
Tyr Lys Thr Phe Asp Glu Leu Tyr Leu Tyr Cys Tyr Tyr Val Ala Gly
                260                 265                 270

act gta gga ttg atg agt gtt cca gtt atg ggt att gca cct gaa tca   1104
Thr Val Gly Leu Met Ser Val Pro Val Met Gly Ile Ala Pro Glu Ser
            275                 280                 285

aag gca aca aca gag agt gta tat aat gct gct ttg gct tta ggg ctt   1152
Lys Ala Thr Thr Glu Ser Val Tyr Asn Ala Ala Leu Ala Leu Gly Leu
        290                 295                 300

gca aat caa cta acc aat ata ctc aga gat gta gga gaa gat gcc aga   1200
Ala Asn Gln Leu Thr Asn Ile Leu Arg Asp Val Gly Glu Asp Ala Arg
    305                 310                 315

aga gga aga gta tac ttg cct caa gat gaa tta gca cag gca ggg ctc   1248
Arg Gly Arg Val Tyr Leu Pro Gln Asp Glu Leu Ala Gln Ala Gly Leu
320                 325                 330                 335

tcc gac gaa gac ata ttt gct gga aga gtg act gat aag tgg agg aac   1296
Ser Asp Glu Asp Ile Phe Ala Gly Arg Val Thr Asp Lys Trp Arg Asn
                340                 345                 350

ttt atg aag aaa caa att cag agg gcg agg aaa ttc ttt gat gag tca   1344
Phe Met Lys Lys Gln Ile Gln Arg Ala Arg Lys Phe Phe Asp Glu Ser
            355                 360                 365

gag aaa ggt gtc aca gaa ctg gac tct gct agt aga tgg cct gtg tta   1392
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Glu Lys Gly Val Thr Glu Leu Asp Ser Ala Ser Arg Trp Pro Val Leu
        370                 375                 380

aca gcg ctg ctg ttg tat cgc aag ata ttg gac gag att gaa gcc aac   1440
Thr Ala Leu Leu Leu Tyr Arg Lys Ile Leu Asp Glu Ile Glu Ala Asn
    385             390                 395

gac tac aac aac ttc aca agg agg gct tat gtt agc aag cca aag aag   1488
Asp Tyr Asn Asn Phe Thr Arg Arg Ala Tyr Val Ser Lys Pro Lys Lys
400                 405                 410                 415

ctt ctc acc ttg ccc att gct tat gca aaa tct ctt gtg ccc cct aat   1536
Leu Leu Thr Leu Pro Ile Ala Tyr Ala Lys Ser Leu Val Pro Pro Asn
                420                 425                 430

aga act tcc tct cca cta gca aag aca tga atgaagtagt tgagtcaatg     1586
Arg Thr Ser Ser Pro Leu Ala Lys Thr
            435                 440

agtattatac actaaagaaa ctcaggtact tgtaaatgag atatcttttg ctaaatgtgt 1646

atcatcaaaa gtagattgta aattcaatat gacaatctct tggtagaata ttttctccac 1706

actcatcaaa ccctcaagtg ag                                          1728
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<213> Nicotiana tabacum

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            20                  25                  30

Val Phe Val Ser Ser Arg Phe Leu Ala Arg Asp Arg Asn Leu Met Trp
        35                  40                  45

Asn Gly Arg Ile Lys Lys Gly Gly Arg Gln Arg Trp Asn Phe Gly Ser
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50 55 60

Leu Ile Ala Asp Pro Arg Tyr Ser Cys Leu Gly Gly Ser Arg Thr Glu
65 70 75 80

Lys Gly Ser Thr Phe Ser Val Gln Ser Ser Leu Val Ala Ser Pro Ala
85 90 95

Gly Glu Met Thr Val Ser Ser Glu Lys Lys Val Tyr Asp Val Val Leu
100 105 110

Lys Gln Ala Ala Leu Val Lys Arg Gln Leu Arg Ser Thr Asp Asp Leu
115 120 125

Glu Val Lys Pro Asp Ile Val Val Pro Gly Asn Leu Gly Leu Leu Ser
130 135 140

Glu Ala Tyr Asp Arg Cys Gly Glu Val Cys Ala Glu Tyr Ala Lys Thr
145 150 155 160

Phe Tyr Leu Gly Thr Lys Leu Met Thr Pro Glu Arg Arg Arg Ala Ile
165 170 175

Trp Ala Ile Tyr Val Trp Cys Arg Arg Thr Asp Glu Leu Val Asp Gly
180 185 190

Pro Asn Ala Ser His Ile Thr Pro Gln Ala Leu Asp Arg Trp Glu Thr
195 200 205

Arg Leu Glu Asp Ile Phe Ser Gly Arg Pro Phe Asp Met Leu Asp Ala
210 215 220

Ala Leu Ser Asp Thr Val Ser Arg Phe Pro Val Asp Ile Gln Pro Phe
225 230 235 240

Arg Asp Met Ile Glu Gly Met Arg Met Asp Leu Trp Lys Ser Arg Tyr
245 250 255

Lys Thr Phe Asp Glu Leu Tyr Leu Tyr Cys Tyr Tyr Val Ala Gly Thr
260 265 270

Val Gly Leu Met Ser Val Pro Val Met Gly Ile Ala Pro Glu Ser Lys

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        275                 280                 285

Ala Thr Thr Glu Ser Val Tyr Asn Ala Ala Leu Ala L u Gly Leu Ala
    290                 295                 300

Asn Gln Leu Thr Asn Ile Leu Arg Asp Val Gly Glu Asp Ala Arg Arg
305                 310                 315                 320

Gly Arg Val Tyr Leu Pro Gln Asp Glu Leu Ala Gln Ala Gly Leu Ser
                325                 330                 335

Asp Glu Asp Ile Phe Ala Gly Arg Val Thr Asp Lys Trp Arg Asn Phe
            340                 345                 350

Met Lys Lys Gln Ile Gln Arg Ala Arg Lys Phe Phe Asp Glu Ser Glu
        355                 360                 365

Lys Gly Val Thr Glu Leu Asp Ser Ala Ser Arg Trp Pro Val Leu Thr
    370                 375                 380

Ala Leu Leu Leu Tyr Arg Lys Ile Leu Asp Glu Ile Glu Ala Asn Asp
385                 390                 395                 400

Tyr Asn Asn Phe Thr Arg Arg Ala Tyr Val Ser Lys Pro Lys Lys Leu
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Leu Thr Leu Pro Ile Ala Tyr Ala Lys Ser Leu Val Pro Pro Asn Arg
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gtttgcttta tttgtgggct ttttataatc ttttttccac aagggaaagt gggtattttc 180

ttgaaagtgg atttagactc tagtgggaat ctactaggag taaatttatt aatttttttat 240

aaattaagca gaggaaggaa ggaaacagaa aacagaaagt aagacaaaaa accttggaat 300

tgttttagaa agccaaggtt ttcctgttca aa atg tct gtt gcc ttg tta tgg 353
Met Ser Val Ala Leu Leu Trp
1 5

gtt gtt tca cct tgt gaa gtc tca aat ggg aca gga ttc ttg gat tca 401
Val Val Ser Pro Cys Glu Val Ser Asn Gly Thr Gly Phe Leu Asp Ser
10 15 20

gtc cgg gag gga aac cgg gtt ttt gat tcg tcg agg cat agg aat tta 449
Val Arg Glu Gly Asn Arg Val Phe Asp Ser Ser Arg His Arg Asn Leu
25 30 35

gtg tgc aat gag aga aac aag aga ggt gtg aaa caa agg tgg aat ttt 497
Val Cys Asn Glu Arg Asn Lys Arg Gly Val Lys Gln Arg Trp Asn Phe
40 45 50 55

ggt tct gta agg tct gct atg gtg gct aca ccg gcg gga gaa atg gcg 545
Gly Ser Val Arg Ser Ala Met Val Ala Thr Pro Ala Gly Glu Met Ala
60 65 70

acg atg aca tca gaa cag atg gtt tat gat gtg gtt tta aaa caa gca 593
Thr Met Thr Ser Glu Gln Met Val Tyr Asp Val Val Leu Lys Gln Ala

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            75                  80                  85

gct tta gtg aag agg cag ttg aga tct gct gat gat tta gaa gtg aag   641
Ala Leu Val Lys Arg Gln Leu Arg Ser Ala Asp Asp Leu Glu Val Lys
         90                  95                 100

ccg gag atc cct ctc ccc ggg aat ttg agc ttg ttg agt gaa gca tat   689
Pro Glu Ile Pro Leu Pro Gly Asn Leu Ser Leu Leu Ser Glu Ala Tyr
    105                 110                 115

gat agg tgt agt gaa gta tgt gca gag tat gca aag aca ttt tac tth   737
Asp Arg Cys Ser Glu Val Cys Ala Glu Tyr Ala Lys Thr Phe Tyr Xaa
120                 125                 130                 135

gga acc atg yta atg act cca gag aga aga agg gct att tgg gca ata   785
Gly Thr Met Xaa Met Thr Pro Glu Arg Arg Arg Ala Ile Trp Ala Ile
                140                 145                 150

tat gtg tgg tgc agg aga aca gat gaa ctt gtt gat ggc cca aac gca   833
Tyr Val Trp Cys Arg Arg Thr Asp Glu Leu Val Asp Gly Pro Asn Ala
            155                 160                 165

tca cat att aca ccc caa gcc tta gat agg tgg gaa gac cgg ctt gaa   881
Ser His Ile Thr Pro Gln Ala Leu Asp Arg Trp Glu Asp Arg Leu Glu
        170                 175                 180

gat gtt ttc agc ggg cga cca ttt gat atg ctc gat gct gct ttg tcc   929
Asp Val Phe Ser Gly Arg Pro Phe Asp Met Leu Asp Ala Ala Leu Ser
    185                 190                 195

gat act gtt tcc aag ttt cca gtt gat att cag ccg ttc aga gat atg   977
Asp Thr Val Ser Lys Phe Pro Val Asp Ile Gln Pro Phe Arg Asp Met
200                 205                 210                 215

att gaa gga atg cgt atg gac ttg agg aag tca aga tat aga aac ttt   1025
Ile Glu Gly Met Arg Met Asp Leu Arg Lys Ser Arg Tyr Arg Asn Phe
                220                 225                 230

gat gag ctt tac ctc tat tgt tat tac gtt gct ggt acg gtt ggg ttg   1073
Asp Glu Leu Tyr Leu Tyr Cys Tyr Tyr Val Ala Gly Thr Val Gly Leu
            235                 240                 245
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atg agt gtt cca att atg ggt att gca cct gat tca aag gca aca aca 1121
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250 255 260

gag agc gta tat aat gca gct ttg gct tta gga atc gca aat caa cta 1169
Glu Ser Val Tyr Asn Ala Ala Leu Ala Leu Gly Ile Ala Asn Gln Leu
265 270 275

acg aac ata ctc aga gat gtt gga gaa gat gcc aga aga gga aga gtc 1217
Thr Asn Ile Leu Arg Asp Val Gly Glu Asp Ala Arg Arg Gly Arg Val
280 285 290 295

tac tta cct caa gat gaa tta gca cag gca ggt ctc ttc gac gat gac 1265
Tyr Leu Pro Gln Asp Glu Leu Ala Gln Ala Gly Leu Phe Asp Asp Asp
300 305 310

ata ttt gct gga aaa gtg act gat aag tgg aga agc ttt atg aag aag 1313
Ile Phe Ala Gly Lys Val Thr Asp Lys Trp Arg Ser Phe Met Lys Lys
315 320 325

caa atc cag agg gca aga aag ttc ttc gat gag gca gag gaa gga gtt 1361
Gln Ile Gln Arg Ala Arg Lys Phe Phe Asp Glu Ala Glu Glu Gly Val
330 335 340

aca caa ctg agc tca gct agc aga tgg cct gta tgg gca tct ttg ctg 1409
Thr Gln Leu Ser Ser Ala Ser Arg Trp Pro Val Trp Ala Ser Leu Leu
345 350 355

ttg tac cgc caa ata ctg gac gag att gaa gcc aat gac tac aac aac 1457
Leu Tyr Arg Gln Ile Leu Asp Glu Ile Glu Ala Asn Asp Tyr Asn Asn
360 365 370 375

ttc aca aag aga gct tat gtg agc aaa cca aag aag cta att tcc tta 1505
Phe Thr Lys Arg Ala Tyr Val Ser Lys Pro Lys Lys Leu Ile Ser Leu
380 385 390

cct att gct tat gca aaa tct ctt gtg ccc cct aca aga act ctt gtc 1553
Pro Ile Ala Tyr Ala Lys Ser Leu Val Pro Pro Thr Arg Thr Leu Val
395 400 405

acc tct agc taa ggcatagaca tcagatttaa attaaagcaa gaaagcatat 1605
Thr Ser Ser

410

actgttaaaa aagaaagaat ttctaaagta gatattgttg tattgatgcc acttgtatat 1665

catcaaaagt aggtagtaaa atccaatata acaatctcta gtagttg 1712

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             20                  25                  30

Ser Ser Arg His Arg Asn Leu Val Cys Asn Glu Arg Asn Lys Arg Gly
         35                  40                  45

Val Lys Gln Arg Trp Asn Phe Gly Ser Val Arg Ser Ala Met Val Ala
     50                  55                  60

Thr Pro Ala Gly Glu Met Ala Thr Met Thr Ser Glu Gln Met Val Tyr
 65                  70                  75                  80

Asp Val Val Leu Lys Gln Ala Ala Leu Val Lys Arg Gln Leu Arg Ser
                 85                  90                  95

Ala Asp Asp Leu Glu Val Lys Pro Glu Ile Pro Leu Pro Gly Asn Leu
            100                 105                 110

Ser Leu Leu Ser Glu Ala Tyr Asp Arg Cys Ser Glu Val Cys Ala Glu
        115                 120                 125

Tyr Ala Lys Thr Phe Tyr Xaa Gly Thr Met Xaa Met Thr Pro Glu Arg
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130 135 140

Arg Arg Ala Ile Trp Ala Ile Tyr Val Trp Cys Arg Arg Thr Asp Glu
145 150 155 160

Leu Val Asp Gly Pro Asn Ala Ser His Ile Thr Pro Gln Ala Leu Asp
165 170 175

Arg Trp Glu Asp Arg Leu Glu Asp Val Phe Ser Gly Arg Pro Phe Asp
180 185 190

Met Leu Asp Ala Ala Leu Ser Asp Thr Val Ser Lys Phe Pro Val Asp
195 200 205

Ile Gln Pro Phe Arg Asp Met Ile Glu Gly Met Arg Met Asp Leu Arg
210 215 220

Lys Ser Arg Tyr Arg Asn Phe Asp Glu Leu Tyr Leu Tyr Cys Tyr Tyr
225 230 235 240

Val Ala Gly Thr Val Gly Leu Met Ser Val Pro Ile Met Gly Ile Ala
245 250 255

Pro Asp Ser Lys Ala Thr Thr Glu Ser Val Tyr Asn Ala Ala Leu Ala
260 265 270

Leu Gly Ile Ala Asn Gln Leu Thr Asn Ile Leu Arg Asp Val Gly Glu
275 280 285

Asp Ala Arg Arg Gly Arg Val Tyr Leu Pro Gln Asp Glu Leu Ala Gln
290 295 300

Ala Gly Leu Phe Asp Asp Asp Ile Phe Ala Gly Lys Val Thr Asp Lys
305 310 315 320

Trp Arg Ser Phe Met Lys Lys Gln Ile Gln Arg Ala Arg Lys Phe Phe
325 330 335

Asp Glu Ala Glu Glu Gly Val Thr Gln Leu Ser Ser Ala Ser Arg Trp
340 345 350

Pro Val Trp Ala Ser Leu Leu Leu Tyr Arg Gln Ile Leu Asp Glu Ile

355 360 365

Glu Ala Asn Asp Tyr Asn Asn Phe Thr Lys Arg Ala Tyr Val Ser Lys
370 375 380

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Pro Pro Thr Arg Thr Leu Val Thr Ser Ser
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cattttcttg gcatttgaca acaaaaggtt ccatttttt tccttttgc tgtatatagc 180

acaattca atg gct act tct tca gct tat ctt tgt tgt cct gca act tct 230
Met Ala Thr Ser Ser Ala Tyr Leu Cys Cys Pro Ala Thr Ser
1 5 10

gct act gga aag aaa cat att ttg cca aat ggg tca gct gga ttc ttg 278
Ala Thr Gly Lys Lys His Ile Leu Pro Asn Gly Ser Ala Gly Phe Leu
15 20 25 30

gtt ttc cgt ggt ccc cgt ttg tcc aac cgg ttt gtg acc cgg aag tca 326
Val Phe Arg Gly Pro Arg Leu Ser Asn Arg Phe Val Thr Arg Lys Ser
35 40 45

gtt att cgt gct gat ttg gac tcc atg gtc tct gat atg agt act aat 374

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Val Ile Arg Ala Asp Leu Asp Ser Met Val Ser Asp Met Ser Thr Asn
             50                  55                  60

gct cca aaa ggg cta ttt cca cct gaa cct gaa cat tat cgg ggg cca   422
Ala Pro Lys Gly Leu Phe Pro Pro Glu Pro Glu His Tyr Arg Gly Pro
         65                  70                  75

aag ctg aaa gta gct att att gga gct ggg ctt gca ggc atg tca act   470
Lys Leu Lys Val Ala Ile Ile Gly Ala Gly Leu Ala Gly Met Ser Thr
     80                  85                  90

gct gtg gag ctc ttg gat caa gga cat gag gtg gat ata tat gaa tca   518
Ala Val Glu Leu Leu Asp Gln Gly His Glu Val Asp Ile Tyr Glu Ser
 95                 100                 105                 110

agg cct ttt att ggt ggg aaa gtg gga tct ttt gtt gat aga cgt gga   566
Arg Pro Phe Ile Gly Gly Lys Val Gly Ser Phe Val Asp Arg Arg Gly
                115                 120                 125

aac cac att gaa atg gga ctg cat gtg ttc ttt ggt tgc tat aat aat   614
Asn His Ile Glu Met Gly Leu His Val Phe Phe Gly Cys Tyr Asn Asn
            130                 135                 140

ttg ttc cgt ttg tta aaa aag gtg ggt gct gaa aaa aat ctg cta gtg   662
Leu Phe Arg Leu Leu Lys Lys Val Gly Ala Glu Lys Asn Leu Leu Val
        145                 150                 155

aag gac cat act cac aca ttt gta aat aaa ggg ggt gaa ata ggg gag   710
Lys Asp His Thr His Thr Phe Val Asn Lys Gly Gly Glu Ile Gly Glu
    160                 165                 170

ctt gat ttc cgc ttt cca gtt gga gca ccc cta cac gga att aat gca   758
Leu Asp Phe Arg Phe Pro Val Gly Ala Pro Leu His Gly Ile Asn Ala
175                 180                 185                 190

ttt ttg tct acc aat cag cta aag att tat gat aag gct aga aat gct   806
Phe Leu Ser Thr Asn Gln Leu Lys Ile Tyr Asp Lys Ala Arg Asn Ala
                195                 200                 205

gta gct ctt gcc ctt agt cca gtg gtg cgg gct tta gtt gat cca gat   854
Val Ala Leu Ala Leu Ser Pro Val Val Arg Ala Leu Val Asp Pro Asp
            210                 215                 220
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ggc gcg ttg cag cag ata cgt gat cta gat agt gta agc ttt tca gag   902
Gly Ala Leu Gln Gln Ile Arg Asp Leu Asp Ser Val Ser Phe Ser Glu
        225                 230                 235

tgg ttt atg tct aaa ggt ggg acg cgt gct agc atc cag agg atg tgg   950
Trp Phe Met Ser Lys Gly Gly Thr Arg Ala Ser Ile Gln Arg Met Trp
    240                 245                 250

gat cct gtc gca tat gct ctt gga ttc att gac tgt gac aat atc agt   998
Asp Pro Val Ala Tyr Ala Leu Gly Phe Ile Asp Cys Asp Asn Ile Ser
255                 260                 265                 270

gct cgg tgt atg ctc act ata ttt gca tta ttt gcc act aaa acg gag   1046
Ala Arg Cys Met Leu Thr Ile Phe Ala Leu Phe Ala Thr Lys Thr Glu
                275                 280                 285

gct tcc cta tta cgc atg ctt aaa ggt tct ccg gac gtt tat ttg agt   1094
Ala Ser Leu Leu Arg Met Leu Lys Gly Ser Pro Asp Val Tyr Leu Ser
            290                 295                 300

ggt cca att aag aag tac atc ttg gat aag ggg gga agg ttt cac atg   1142
Gly Pro Ile Lys Lys Tyr Ile Leu Asp Lys Gly Gly Arg Phe His Met
        305                 310                 315

agg tgg ggg tgc aga cag gta ctc tat gag aca tcc tct gat ggc agt   1190
Arg Trp Gly Cys Arg Gln Val Leu Tyr Glu Thr Ser Ser Asp Gly Ser
    320                 325                 330

atg tat gtc agc ggg ctt gcc atg tca aag gcc act cag aag aaa gtt   1238
Met Tyr Val Ser Gly Leu Ala Met Ser Lys Ala Thr Gln Lys Lys Val
335                 340                 345                 350

gta aaa gct gat gcc tat gtc gct gca tgt gat gtc cct gga att aaa   1286
Val Lys Ala Asp Ala Tyr Val Ala Ala Cys Asp Val Pro Gly Ile Lys
                355                 360                 365

cga ttg gta cct cag aag tgg agg gaa ttg gaa ttc ttt gac aac att   1334
Arg Leu Val Pro Gln Lys Trp Arg Glu Leu Glu Phe Phe Asp Asn Ile
            370                 375                 380

tac aaa ttg gtt gga gtg cct gtt gtt acg gta caa cta cga tac aat   1382
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Tyr Lys Leu Val Gly Val Pro Val Val Thr Val Gln Leu Arg Tyr Asn
        385                 390                 395

ggc tgg gtt aca gag ttg cag gac ttg gag cgt tcg agg caa ttg aag   1430
Gly Trp Val Thr Glu Leu Gln Asp Leu Glu Arg Ser Arg Gln Leu Lys
    400                 405                 410

cgc gct aca ggt ttg gac aat ctc ctg tat aca cca gat gca gat ttc   1478
Arg Ala Thr Gly Leu Asp Asn Leu Leu Tyr Thr Pro Asp Ala Asp Phe
415                 420                 425                 430

tct tgc ttt gcg gac ctt gca ttg gca tct cct gaa gat tat tac att   1526
Ser Cys Phe Ala Asp Leu Ala Leu Ala Ser Pro Glu Asp Tyr Tyr Ile
                435                 440                 445

gag ggc caa ggc tca ttg ctt caa tgt gtc ctt aca cct ggt gac cct   1574
Glu Gly Gln Gly Ser Leu Leu Gln Cys Val Leu Thr Pro Gly Asp Pro
            450                 455                 460

tac atg cct cta cta aat gat gaa atc ata aaa aga gtg tca aag cag   1622
Tyr Met Pro Leu Leu Asn Asp Glu Ile Ile Lys Arg Val Ser Lys Gln
        465                 470                 475

gtt ttg gca cta ttt cct tct tcc caa ggt ctt gag gtt acc tgg tca   1670
Val Leu Ala Leu Phe Pro Ser Ser Gln Gly Leu Glu Val Thr Trp Ser
    480                 485                 490

tca gtt gtg aaa att ggg caa tcc cta tat cgt gaa gga cct ggt aaa   1718
Ser Val Val Lys Ile Gly Gln Ser Leu Tyr Arg Glu Gly Pro Gly Lys
495                 500                 505                 510

gac cca ttc aga cct gat cag aag act cca gtg gaa aat ttc ttt ctt   1766
Asp Pro Phe Arg Pro Asp Gln Lys Thr Pro Val Glu Asn Phe Phe Leu
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gct ggc tca tat aca aaa cag gac tac ata gat agc atg gaa ggg gca   1814
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Thr Leu Ser Gly Arg Gln Ala Ser Ala Tyr Val Cys Asp Ala Gly Glu
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Ile Ser Glu Gly Val Ser Val Ser Asp Glu Leu Ser Leu Val
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Glu Leu Leu Asp Gln Gly His Glu Val Asp Ile Tyr Glu Ser Arg Pro
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Arg Leu Leu Lys Lys Val Gly Ala Glu Lys Asn Leu Leu Val Lys Asp
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His Thr His Thr Phe Val Asn Lys Gly Gly Glu Ile Gly Glu Leu Asp
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Phe Arg Phe Pro Val Gly Ala Pro Leu His Gly Ile Asn Ala Phe Leu
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Met Ser Lys Gly Gly Thr Arg Ala Ser Ile Gln Arg Met Trp Asp Pro
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Val Ala Tyr Ala Leu Gly Phe Ile Asp Cys Asp Asn Ile Ser Ala Arg
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Cys Met Leu Thr Ile Phe Ala Leu Phe Ala Thr Lys Thr Glu Ala Ser
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Leu Leu Arg Met Leu Lys Gly Ser Pro Asp Val Tyr Leu Ser Gly Pro
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Ile Lys Lys Tyr Ile Leu Asp Lys Gly Gly Arg Phe His Met Arg Trp

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Gly Cys Arg Gln Val Leu Tyr Glu Thr Ser Ser Asp Gly Ser Met Tyr
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Val Ser Gly Leu Ala Met Ser Lys Ala Thr Gln Lys Lys Val Val Lys
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Ala Asp Ala Tyr Val Ala Ala Cys Asp Val Pro Gly Ile Lys Arg Leu
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Val Pro Gln Lys Trp Arg Glu Leu Glu Phe Phe Asp Asn Ile Tyr Lys
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Val Thr Glu Leu Gln Asp Leu Glu Arg Ser Arg Gln Leu Lys Arg Ala
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Thr Gly Leu Asp Asn Leu Leu Tyr Thr Pro Asp Ala Asp Phe Ser Cys
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Phe Ala Asp Leu Ala Leu Ala Ser Pro Glu Asp Tyr Tyr Ile Glu Gly
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Gln Gly Ser Leu Leu Gln Cys Val Leu Thr Pro Gly Asp Pro Tyr Met
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Pro Leu Leu Asn Asp Glu Ile Ile Lys Arg Val Ser Lys Gln Val Leu
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Ala Leu Phe Pro Ser Ser Gln Gly Leu Glu Val Thr Trp Ser Ser Val
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Val Lys Ile Gly Gln Ser Leu Tyr Arg Glu Gly Pro Gly Lys Asp Pro
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